

SEQUENCE LISTING



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<120> PNEUMOCOCCAL SURFACE PROTEIN C (PSPC), EPITOPIC REGIONS
AND STRAIN SELECTION THEREOF, AND USES THEREFOR

<130> 454312-3140

<140> 09/298,523

<141> 1999-04-23

<150> 60/082,728

<151> 1998-04-23

<160> 276

<170> PatentIn Ver. 2.0

<210> 1

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 1

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
20 25 30

Gly Val Val His Ala Glu Gly Val Arg Gly Ile Thr Gln Ser Gly Asn
35 40 45

Asn Leu Thr Val Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala
50 55 60

Asp Glu Val Glu Ser His
65 70

<210> 2

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 2

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
20 25 30

Gly Val Val His Ala Glu Gly Val Arg Gly Ile Thr Gln Ser Gly Asn
35 40 45

Asn Leu Thr Val Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala
50 55 60

Asp Glu Val Glu Ser His
65 70

<210> 3

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 3

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ile Thr Gln Val Ala Thr
35 40 45

Ser Tyr Asn Lys Ala Asn Glu Ser Gln Thr Glu His Arg Lys Ala Ala
50 55 60

Lys Gln Val Asp Glu Asp
65 70

<210> 4

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 4

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
 20 25 30
 Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
 35 40 45
 Ser Ser Asn Met Ala Lys Glu Ser Gln Thr Glu His Arg Lys Ala Ala
 50 55 60
 Lys Gln Val Val Asp Asp
 65 70

<210> 5
 <211> 32
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 5
 Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr Ser Ser Asn Met Ala Lys
 1 5 10 15
 Glu Ser Gln Thr Glu His Arg Lys Ala Ala Lys Gln Val Val Asp Asp
 20 25 30

<210> 6
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 6
 Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
 20 25 30
 Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
 35 40 45
 Ser Ser Asn Met Ala Lys Glu Ser Gln Thr Glu His Arg Lys Ala Ala
 50 55 60

Lys Gln Val Val Asp Asp

65

70

<210> 7

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 7

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
35 40 45

Ser Ser Asn Met Ala Lys Glu Ser Gln Thr Glu His Arg Lys Ala Ala
50 55 60

Lys Gln Val Val Asp Asp
65 70

<210> 8

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 8

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
20 25 30

Gly Val Val His Ala Glu Gly Val Arg Gly Ser Thr Gln Ser Glu Asn
35 40 45

Thr Pro Lys Val Thr Ser Ser Gly Gln Thr Glu His Arg Lys Ala Ala
50 55 60

Lys Gln Val Val Asp Asp
65 70

<210> 9

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 9
Met Phe Ala Ser Lys Asn Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15
Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Met Gly
20 25 30
Ser Val Val His Ala Thr Glu Val Arg Gly Ser Thr Gln Lys Glu Val
35 40 45
Thr Thr Gln Val Ala Thr Ser Phe Asn Lys Ala Asn Lys Ser Gln Thr
50 55 60
Glu His Met Lys Ala Asp
65 70

<210> 10
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 10
Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15
Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
20 25 30
Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
35 40 45
Ser Ser Asn Met Ala Lys Ser Phe Asn Thr Glu His Arg Lys Ala Ala
50 55 60
Lys Gln Val Val Asp Asp
65 70

<210> 11
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 11

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
35 40 45

Phe Ser Asn Met Ala Asn Lys Ser Gln Thr Glu Gln Gly Glu Ala Ala
50 55 60

Lys Gln Ile Asn Ile Glu
65 70

<210> 12

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 12

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Val Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr
35 40 45

Ser Ser Asn Arg Ala Asn Glu Ser Gln Ala Glu Gln Gly Glu Gln Pro
50 55 60

Lys Lys Leu Asp Ser Glu
65 70

<210> 13

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 13

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Val Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr
35 40 45

Ser Ser Asn Arg Ala Asn Glu Ser Gln Ala Glu Gln Gly Glu Gln Pro
50 55 60

Lys Lys Leu Asp Ser Glu
65 70

<210> 14

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 14

Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys Val Gln
1 5 10 15

Ser Glu Ile Gln Leu Asp Lys Arg Lys Asp Arg His Thr Gln Asn Val
20 25 30

Gly Leu Ile Thr Lys Leu Ser Glu Ile Lys Lys Lys Tyr Leu Tyr Asp
35 40 45

Leu Lys Val Asn Val Leu Ser Glu Ala Glu Leu Thr Ser Lys Thr Lys
50 55 60

Glu Thr Lys Glu Lys Leu
65 70

<210> 15

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 15

Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys Val Gln
1 5 10 15

Ser Glu Ile Gln Leu Asp Lys Arg Lys Asp Arg His Thr Gln Asn Val
20 25 30

Gly Leu Ile Thr Lys Leu Ser Glu Ile Lys Lys Lys Tyr Leu Tyr Asp

35 40 45
 Leu Lys Val Asn Val Leu Ser Glu Ala Glu Leu Thr Ser Lys Thr Lys
 50 55 60

Glu Thr Lys Glu Lys Leu
 65 70

<210> 16
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 16
 Ile Lys Lys Met Leu Ser Glu Ile Gln Glu Tyr Ile Lys Lys Met Leu
 1 5 10 15

Ser Glu Ile Gln Leu Asp Lys Arg Lys Asp Arg His Thr Gln Asn Val
 20 25 30

Asn Leu Asn Arg Lys Leu Ser Ala Ile Gln Thr Lys Tyr Leu Tyr Glu
 35 40 45

Leu Arg Val Leu Lys Glu Ser Lys Ser Lys Lys Glu Glu Leu Thr Ser
 50 55 60

Lys Thr Lys Lys Glu Leu
 65 70

<210> 17
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 17
 Ile Lys Lys Met Leu Ser Glu Ile Gln Glu Tyr Ile Glu Lys Met Leu
 1 5 10 15

Arg Glu Ile Gln Leu Asp Arg Arg Lys Asp Arg His Thr Gln Asn Val
 20 25 30

Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg Glu
 35 40 45

Leu Asn Val Leu Glu Glu Ser Lys Lys Ser Lys Asp Glu Leu Pro Ser
 50 55 60

Glu Ile Lys Ala Lys Leu
65 70

<210> 18
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 18
Ile Lys Lys Met Leu Ser Glu Ile Gln Glu Tyr Ile Glu Lys Met Leu
1 5 10 15

Arg Glu Ile Gln Leu Asp Arg Arg Lys Asp Arg His Thr Gln Asn Val
20 25 30

Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg Glu
35 40 45

Leu Asn Val Leu Glu Glu Ser Lys Lys Ser Lys Asp Glu Leu Pro Ser
50 55 60

Glu Ile Lys Ala Lys Leu
65 70

<210> 19
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 19
Ile Lys Lys Met Leu Ser Glu Ile Gln Glu Tyr Ile Glu Lys Met Leu
1 5 10 15

Arg Glu Ile Gln Leu Asp Arg Arg Lys Asp Arg His Thr Gln Asn Val
20 25 30

Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg Glu
35 40 45

Leu Asn Val Leu Glu Glu Ser Lys Lys Ser Lys Asp Glu Leu Pro Ser
50 55 60

Glu Ile Lys Ala Lys Leu
65 70

<210> 20
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 20
Ile Lys Lys Met Leu Ser Glu Ile Gln Glu Tyr Ile Glu Lys Met Leu
1 5 10 15
Arg Glu Ile Gln Leu Asp Arg Arg Lys Asp Arg His Thr Gln Asn Val
20 25 30
Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg Glu
35 40 45
Leu Asn Val Leu Glu Glu Ser Lys Lys Ser Lys Asp Glu Leu Pro Ser
50 55 60
Glu Ile Lys Ala Lys Leu
65 70

<210> 21
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 21
Ile Lys Lys Met Leu Asp Glu Val Asp Glu Tyr Ile Lys Lys Met Leu
1 5 10 15
Ser Glu Ile Gln Leu Asp Lys Arg Lys Asp Arg His Thr His Asn Phe
20 25 30
Ala Leu Asn Leu Lys Leu Ser Arg Ile Lys Thr Glu Tyr Leu Tyr Lys
35 40 45
Leu Lys Val Asn Val Leu Glu Glu Lys Ser Lys Ala Glu Leu Thr Ser
50 55 60
Lys Thr Lys Lys Glu Val
65 70

<210> 22
<211> 70
<212> PRT

<213> Streptococcus pneumoniae

<400> 22

Ile Lys Lys Met Ala Lys Gln Val Asp Glu Tyr Ile Thr Lys Lys Leu
1 5 10 15

Ser Glu Ile Gln Leu Asp Arg Arg Lys Asp Arg His Thr Gln Asn Val
20 25 30

Gly Leu Leu Thr Lys Leu Gly Val Ile Lys Thr Glu Tyr Leu His Arg
35 40 45

Leu Ser Val Ser Lys Glu Glu Glu Lys Ser Glu Ala Glu Leu Pro Ser
50 55 60

Glu Ile Lys Ala Lys Leu
65 70

<210> 23

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 23

Ile Lys Lys Met Ala Lys Gln Val Asp Glu Tyr Ile Glu Lys Met Leu
1 5 10 15

Arg Glu Ile Gln Leu Asp Arg Arg Lys Asp Arg His Thr Gln Asn Val
20 25 30

Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg Glu
35 40 45

Leu Asn Val Leu Glu Glu Glu Glu Lys Ser Lys Asp Glu Leu Pro Ser
50 55 60

Glu Ile Lys Ala Lys Leu
65 70

<210> 24

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 24

Arg Asp Lys Ala Lys Thr Ala Val Ser Glu Tyr Lys Glu Lys Lys Val

1	5	10	15
Ser Glu Ile Tyr Thr Lys Leu Glu Arg Asp Arg His Lys Asp Thr Val			
20	25	30	
Asp Leu Val Asn Lys Leu Gln Glu Ile Lys Asn Glu Tyr Leu Asn Lys			
35	40	45	
Ile Val Gln Ser Thr Ser Glu Lys Thr Glu Ile Gln Gly Leu Ile Thr			
50	55	60	
Thr Ser Arg Ser Lys Leu			
65	70		

<210> 25
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 25
Arg Asp Lys Ala Arg Lys Glu Val Glu Glu Tyr Val Lys Lys Ile Val
1 5 10 15
Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys Arg His Thr Ile Thr Val
20 25 30
Ala Leu Val Asn Glu Leu Asn Asn Ile Lys Asn Glu Tyr Leu Asn Lys
35 40 45
Ile Val Glu Ser Thr Ser Glu Glu Ser Gln Leu Gln Ile Leu Met Met
50 55 60
Glu Ser Arg Ser Lys Val
65 70

<210> 26
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 26
Arg Asp Lys Ala Arg Lys Glu Val Glu Glu Tyr Val Lys Lys Ile Val
1 5 10 15
Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys Arg His Thr Ile Thr Val
20 25 30

Ala Leu Val Asn Glu Leu Asn Asn Ile Lys Asn Glu Tyr Leu Asn Lys
35 40 45

Ile Val Glu Ser Thr Ser Glu Glu Ser Gln Leu Gln Ile Leu Met Met
50 55 60

Glu Ser Arg Ser Lys Val
65 70

<210> 27
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 27
Thr Ala Thr Phe Glu Gln Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
1 5 10 15

Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
20 25 30

Leu Pro Thr Glu Pro Glu Lys Lys Val Ala Glu Ala Gln Lys Lys Val
35 40 45

Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Lys Asp Arg Arg
50 55 60

Asn Tyr Pro Thr Ile Thr
65 70

<210> 28
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 28
Thr Ala Thr Phe Glu Gln Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
1 5 10 15

Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
20 25 30

Leu Pro Thr Glu Pro Glu Lys Lys Val Ala Glu Ala Gln Lys Lys Val
35 40 45

Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Lys Asp Arg Arg
 50 55 60

Asn Tyr Pro Thr Ile Thr
 65 70

<210> 29
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 29
 Asp Ala Ala Phe Glu Lys Phe Lys Lys Glu Thr Ser Ser Ser Ser Ser
 1 5 10 15

Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30

Leu Pro Thr Glu Pro Glu Lys Lys Val Ala Glu Leu Thr Lys Lys Leu
 35 40 45

Ala Glu Ala Lys Gln Lys Ala Lys Ala Gln Lys Glu Glu Asp Phe Arg
 50 55 60

Asn Tyr Pro Thr Asn Thr
 65 70

<210> 30
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 30
 Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
 1 5 10 15

Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30

Leu Pro Leu Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val
 35 40 45

Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60

Asn Tyr Pro Thr Asn Thr

65

70

<210> 31

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 31

Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
 1 5 10 15

Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30

Leu Pro Leu Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val
 35 40 45

Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60

Asn Tyr Pro Thr Asn Thr
 65 70

<210> 32

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 32

Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
 1 5 10 15

Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30

Leu Pro Leu Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val
 35 40 45

Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60

Asn Tyr Pro Thr Asn Thr
 65 70

<210> 33

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 33
Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
1 5 10 15
Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
20 25 30
Leu Pro Leu Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val
35 40 45
Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg
50 55 60
Asn Tyr Pro Thr Asn Thr
65 70

<210> 34
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 34
Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
1 5 10 15
Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
20 25 30
Leu Pro Leu Lys Leu Gly Glu Lys Val Ala Glu Ala Gln Lys Lys Val
35 40 45
Glu Glu Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp His Arg
50 55 60
Asn Tyr Pro Thr Asn Thr
65 70

<210> 35
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 35
 Asp Ala Ala Phe Glu Gln Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
 1 5 10 15
 Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30
 Leu Pro Thr Glu Pro Gly Lys Lys Val Ala Glu Ala Glu Lys Lys Val
 35 40 45
 Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60
 Asn Tyr Pro Thr Ile Thr
 65 70

<210> 36
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 36
 Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Ser Ser Ser Ser Ser
 1 5 10 15
 Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30
 Leu Pro Leu Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val
 35 40 45
 Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60
 Asn Tyr Pro Thr Asn Thr
 65 70

<210> 37
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 37
 Asp Glu Ala Val Ser Lys Tyr Lys Lys Ala Pro Ser Ser Ser Ser Ser
 1 5 10 15

Ser Gly Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30
 Lys Pro Thr Glu Leu Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val
 35 40 45
 Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60
 Asn Tyr Pro Thr Asn Thr
 65 70

<210> 38
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 38
 Asp Glu Ala Val Ser Lys Phe Glu Lys Asp Ser Ser Ser Ser Ser Ser
 1 5 10 15
 Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30
 Lys Pro Thr Glu Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val
 35 40 45
 Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60
 Asn Tyr Pro Thr Ile Thr
 65 70

<210> 39
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 39
 Asp Glu Ala Val Ser Lys Phe Glu Lys Asp Ser Ser Ser Ser Ser Ser
 1 5 10 15
 Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn
 20 25 30
 Lys Pro Thr Glu Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val

35 40 45
 Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg
 50 55 60

Asn Tyr Pro Thr Ile Thr
 65 70

<210> 40
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 40
 Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys
 1 5 10 15

Lys Ala Glu Leu Glu Leu Val Lys Val Lys Ala Lys Glu Ser Gln Asp
 20 25 30

Glu Glu Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala
 35 40 45

Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu
 50 55 60

Ala Thr Arg Leu Glu Asn
 65 70

<210> 41
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 41
 Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys
 1 5 10 15

Lys Ala Glu Leu Glu Leu Val Lys Val Lys Ala Lys Glu Ser Gln Asp
 20 25 30

Glu Glu Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala
 35 40 45

Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu
 50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 42
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 42
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys
1 5 10 15

Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Pro Ser Arg Asn
20 25 30

Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala
35 40 45

Glu Ala Thr Arg Leu Glu Glu Ile Lys Thr Glu Arg Lys Lys Ala Glu
50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 43
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 43
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys
1 5 10 15

Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser Arg Asn
20 25 30

Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala
35 40 45

Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu
50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 44
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 44
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys
1 5 10 15
Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser Arg Asn
20 25 30
Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala
35 40 45
Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu
50 55 60
Ala Thr Arg Leu Glu Asn
65 70

<210> 45
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 45
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys
1 5 10 15
Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser Arg Asn
20 25 30
Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala
35 40 45
Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu
50 55 60
Ala Thr Arg Leu Glu Asn
65 70

<210> 46
<211> 70
<212> PRT

<213> Streptococcus pneumoniae

<400> 46

Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys
1 5 10 15

Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Phe Arg Asn
20 25 30

Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala
35 40 45

Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu
50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 47

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 47

Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys
1 5 10 15

Glu Ala Glu Leu Glu Leu Leu Lys Glu Glu Ala Lys Glu Thr Arg Asn
20 25 30

Glu Asp Thr Ile Asn Gln Ala Lys Ala Lys Val Lys Ser Glu Gln Ala
35 40 45

Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala Glu
50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 48

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 48

Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys

1	5	10	15
Lys Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Gly Ser Arg Asn			
20	25	30	
Glu Gln Lys Val Asn Gln Ala Lys Ala Lys Val Glu Ser Lys Gln Ala			
35	40	45	
Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala Glu			
50	55	60	
Thr Thr Arg Leu Glu Asn			
65	70		

<210> 49
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 49
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys
1 5 10 15
Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser Arg Asn
20 25 30
Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala
35 40 45
Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu
50 55 60
Ala Thr Arg Leu Glu Asn
65 70

<210> 50
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 50
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys
1 5 10 15
Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser Arg Asn
20 25 30

Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala
35 40 45

Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu
50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 51
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 51
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys
1 5 10 15

Lys Ala Glu Leu Glu Leu Val Lys Val Lys Ala Asn Glu Pro Arg Asp
20 25 30

Glu Gln Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala
35 40 45

Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala Glu
50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 52
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 52
Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys
1 5 10 15

Lys Ala Glu Leu Glu Leu Val Lys Val Lys Ala Asn Glu Pro Arg Asp
20 25 30

Glu Gln Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala
35 40 45

Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala Glu
50 55 60

Ala Thr Arg Leu Glu Asn
65 70

<210> 53

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 53

Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu Ala Lys Arg Lys Ala Asp
1 5 10 15

Ala Lys Leu Lys Glu Ala Val Glu Lys Lys Gln Asn Val Ala Thr Ser
20 25 30

Glu Gln Asp Lys Pro Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu
35 40 45

Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
50 55 60

Ser Val Gly Glu Glu Thr
65 70

<210> 54

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 54

Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu Ala Lys Arg Lys Ala Asp
1 5 10 15

Ala Lys Leu Lys Glu Ala Val Glu Lys Lys Gln Asn Val Ala Thr Ser
20 25 30

Glu Gln Asp Lys Pro Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu
35 40 45

Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
50 55 60

Ser Val Gly Glu Glu Thr

65

70

<210> 55

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 55

Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu

1

5

10

15

Glu Ser Glu Lys Lys Ala Ala Glu Ala Lys Gln Lys Val Asp Thr Lys

20

25

30

Glu Gln Gly Lys Pro Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu

35

40

45

Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser

50

55

60

Ser Val Gly Glu Glu Thr

65

70

<210> 56

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 56

Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp

1

5

10

15

Gly Lys Leu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser

20

25

30

Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu

35

40

45

Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser

50

55

60

Ser Val Gly Glu Glu Thr

65

70

<210> 57

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 57
Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp
1 5 10 15
Ala Lys Leu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
20 25 30
Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu
35 40 45
Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
50 55 60
Ser Val Gly Glu Glu Thr
65 70

<210> 58
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 58
Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp
1 5 10 15
Ala Lys Leu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
20 25 30
Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu
35 40 45
Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
50 55 60
Ser Val Gly Glu Glu Thr
65 70

<210> 59
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 59
 Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp
 1 5 10 15
 Ala Lys Leu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
 20 25 30
 Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu
 35 40 45
 Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
 50 55 60
 Ser Val Gly Glu Glu Thr
 65 70

<210> 60
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 60
 Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu Ala Lys Arg Lys Ala Glu
 1 5 10 15
 Ala Glu Glu Val Lys Asp Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
 20 25 30
 Asp Gln Gly Lys Leu Lys Arg Arg Thr Lys Arg Ala Val Pro Gly Glu
 35 40 45
 Pro Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
 50 55 60
 Ser Val Gly Glu Glu Thr
 65 70

<210> 61
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 61
 Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu Ala Lys Arg Lys Ala Asp
 1 5 10 15

Ala Lys Glu Val Gln Asp Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
20 25 30

Asp Gln Gly Glu Ser Lys Arg Arg Val Lys Gly Gly Val Pro Gly Glu
35 40 45

Gln Ala Thr Leu Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
50 55 60

Ser Val Gly Glu Glu Thr
65 70

<210> 62

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 62

Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp
1 5 10 15

Ala Lys Leu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
20 25 30

Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu
35 40 45

Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
50 55 60

Ser Val Gly Glu Glu Thr
65 70

<210> 63

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 63

Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp
1 5 10 15

Ala Lys Leu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
20 25 30

Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu

35 40 45
 Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
 50 55 60

Ser Val Gly Glu Glu Thr
 65 70

<210> 64
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 64
 Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Arg Ala Asp
 1 5 10 15

Ala Lys Glu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
 20 25 30

Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu
 35 40 45

Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
 50 55 60

Ser Val Gly Glu Glu Thr
 65 70

<210> 65
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 65
 Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu Ala Lys Arg Arg Ala Asp
 1 5 10 15

Ala Lys Glu Lys Glu Ala Ala Glu Ala Lys Gln Asn Val Ala Thr Ser
 20 25 30

Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu
 35 40 45

Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
 50 55 60

Ser Val Gly Glu Glu Thr
65 70

<210> 66
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 66
Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys Met Leu Ser Glu Ile Gln
20 25 30
Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60
Asn Ser Lys Lys Glu Glu
65 70

<210> 67
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 67
Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys Met Leu Ser Glu Ile Gln
20 25 30
Leu Asp Gly Arg Lys His Thr Pro Asn Val Asn Leu Asn Ile Lys Leu
35 40 45
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60
Asn Ser Lys Lys Glu Glu
65 70

<210> 68
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 68
Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys Met Leu Ser Glu Ile Gln
20 25 30
Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60
Asn Ser Lys Lys Glu Glu
65 70

<210> 69
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 69
Leu Pro Ser Ser Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys Met Leu Ser Glu Ile Gln
20 25 30
Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60
Asn Ser Lys Lys Glu Glu
65 70

<210> 70
<211> 70
<212> PRT

<213> Streptococcus pneumoniae

<400> 70

Leu Pro Ser Ser Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
20 25 30
Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60
Asn Ser Lys Lys Glu Glu
65 70

<210> 71

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 71

Leu Pro Ser Ser Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
20 25 30
Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60
Asn Ser Lys Lys Glu Glu
65 70

<210> 72

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 72

Leu Pro Ser Ser Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His

1	5	10	15
Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln			
20	25	30	
Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu			
35	40	45	
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu			
50	55	60	
Asn Ser Lys Lys Glu Glu			
65	70		

<210> 73
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 73
Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
20 25 30
Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45
Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60
Asn Ser Lys Lys Glu Glu
65 70

<210> 74
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 74
Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15
Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
20 25 30

Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
 35 40 45

Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
 50 55 60

Asn Ser Lys Lys Glu Glu
 65 70

<210> 75

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 75

Leu Pro Ser Ser Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
 1 5 10 15

Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
 20 25 30

Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
 35 40 45

Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
 50 55 60

Asn Ser Lys Lys Glu Glu
 65 70

<210> 76

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 76

Leu Pro Ser Ser Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
 1 5 10 15

Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
 20 25 30

Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
 35 40 45

Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60

Asn Ser Lys Lys Glu Glu
65 70

<210> 77

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 77

Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15

Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
20 25 30

Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45

Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60

Asn Ser Lys Lys Glu Glu
65 70

<210> 78

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 78

Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu His
1 5 10 15

Arg Lys Asp Val Asp Glu Tyr Glu Lys Lys Met Leu Ser Glu Ile Gln
20 25 30

Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu
35 40 45

Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu
50 55 60

Asn Ser Lys Lys Glu Glu

65

70

<210> 79

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 79

Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Thr Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Glu Glu Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Lys
65 70

<210> 80

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 80

Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Thr Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Glu Glu Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Lys
65 70

<210> 81

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 81
Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15
Lys Lys Asp Thr Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys
20 25 30
Lys Val Glu Glu Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45
Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile
50 55 60
Ala Glu Ser Asp Val Lys
65 70

<210> 82
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 82
Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15
Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys
20 25 30
Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45
Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ile
50 55 60
Ala Glu Ser Asp Val Lys
65 70

<210> 83
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 83

Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Lys
65 70

<210> 84

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 84

Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Lys
65 70

<210> 85

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 85

Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Lys
65 70

<210> 86

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 86

Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Gln Lys
20 25 30

Lys Val Ala Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Lys
65 70

<210> 87

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 87

Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Ala Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp

35 40 45
 Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile
 50 55 60

Ala Glu Ser Asp Val Lys
 65 70

<210> 88
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 88
 Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
 1 5 10 15

Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys
 20 25 30

Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
 35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ile
 50 55 60

Ala Glu Ser Asp Val Lys
 65 70

<210> 89
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 89
 Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
 1 5 10 15

Lys Lys Asp Ser Leu Lys Ser Glu Lys Lys Val Ala Glu Ala Glu Lys
 20 25 30

Lys Val Glu Glu Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
 35 40 45

Tyr Arg Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu Leu Glu Ile
 50 55 60

Ala Glu Ser Asp Val Glu
65 70

<210> 90
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 90
Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Ser Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Glu
65 70

<210> 91
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 91
Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe
1 5 10 15

Lys Lys Asp Ser Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys
20 25 30

Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp
35 40 45

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile
50 55 60

Ala Glu Ser Asp Val Glu
65 70

<210> 92
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 92
Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Asn Glu Ser
1 5 10 15
Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys
20 25 30
Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45
Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala
50 55 60
Ala Glu Ala Lys Gln Lys
65 70

<210> 93
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 93
Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Asn Glu Ser
1 5 10 15
Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys
20 25 30
Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45
Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala
50 55 60
Ala Glu Ala Lys Gln Lys
65 70

<210> 94
<211> 70
<212> PRT

<213> Streptococcus pneumoniae

<400> 94

Val Lys Lys Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Asn Glu Ser
1 5 10 15

Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys
20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 95

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 95

Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro
1 5 10 15

Arg Asp Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys
20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 96

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 96

Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro

1 5 10 15
 Arg Asp Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys
 20 25 30
 Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys
 35 40 45
 Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
 50 55 60
 Ala Glu Ala Lys Gln Lys
 65 70

<210> 97
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 97
 Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro
 1 5 10 15
 Arg Asp Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys
 20 25 30
 Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys
 35 40 45
 Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
 50 55 60
 Ala Glu Ala Lys Gln Lys
 65 70

<210> 98
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 98
 Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro
 1 5 10 15
 Arg Asp Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys
 20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 99

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 99

Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser
1 5 10 15

Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Lys Val Glu Ser Lys
20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Arg Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 100

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 100

Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser
1 5 10 15

Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Glu Val Glu Ser Lys
20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 101

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 101

Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro
1 5 10 15

Arg Asp Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys
20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 102

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 102

Val Lys Lys Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro
1 5 10 15

Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Lys Val Glu Ser Glu
20 25 30

Glu Thr Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys

65

70

<210> 103

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 103

Val Lys Lys Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro
1 5 10 15

Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Glu Val Glu Ser Lys
20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 104

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 104

Val Lys Lys Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro
1 5 10 15

Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Glu Val Glu Ser Lys
20 25 30

Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
35 40 45

Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Lys Ala
50 55 60

Ala Glu Ala Lys Gln Lys
65 70

<210> 105

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 105

Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60

Asp Lys Ile Asp Glu Leu
65 70

<210> 106
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 106

Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60

Asp Lys Ile Asp Glu Leu
65 70

<210> 107
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 107

Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60

Asp Lys Ile Asp Glu Leu
65 70

<210> 108

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 108

Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60

Asp Lys Ile Asp Glu Leu
65 70

<210> 109

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 109

Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
 20 25 30
 Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
 35 40 45
 Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
 50 55 60
 Asp Lys Ile Asp Glu Leu
 65 70

<210> 110
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 110
 Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
 1 5 10 15
 Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
 20 25 30
 Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
 35 40 45
 Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
 50 55 60
 Asp Lys Ile Asp Glu Leu
 65 70

<210> 111
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 111
 Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
 1 5 10 15
 Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
 20 25 30
 Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser

35 40 45
 Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
 50 55 60

Asp Lys Ile Asp Glu Leu
 65 70

<210> 112
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 112
 Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
 1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
 20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
 35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
 50 55 60

Asp Lys Ile Asp Glu Leu
 65 70

<210> 113
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 113
 Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
 1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
 20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
 35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
 50 55 60

Asp Lys Ile Asp Glu Leu
65 70

<210> 114
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 114
Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60

Asp Lys Ile Asp Glu Leu
65 70

<210> 115
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 115
Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15

Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30

Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45

Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60

Asp Lys Ile Asp Glu Leu
65 70

<210> 116
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 116
Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15
Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30
Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45
Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60
Asp Lys Ile Asp Glu Leu
65 70

<210> 117
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 117
Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu Glu
1 5 10 15
Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu Ser
20 25 30
Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln Ser
35 40 45
Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu Ser
50 55 60
Asp Lys Ile Asp Glu Leu
65 70

<210> 118
<211> 70
<212> PRT

<213> Streptococcus pneumoniae

<400> 118

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys
35 40 45

Ala Val Asp Glu Pro Glu Thr Pro Ala Pro Ala Pro Gln Pro Ala Pro
50 55 60

Ala Pro Glu Lys Pro Ala
65 70

<210> 119

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 119

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys
35 40 45

Ala Val Asp Glu Pro Glu Thr Pro Ala Pro Ala Pro Gln Pro Ala Pro
50 55 60

Ala Pro Glu Lys Pro Ala
65 70

<210> 120

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 120

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly

1 5 10 15
 Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
 20 25 30
 Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys
 35 40 45
 Ala Val Asp Glu Pro Glu Thr Pro Ala Pro Ala Pro Gln Pro Ala Pro
 50 55 60
 Ala Pro Glu Lys Pro Ala
 65 70

<210> 121
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 121
 Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
 1 5 10 15
 Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
 20 25 30
 Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Val Lys Glu
 35 40 45
 Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Thr Gln Pro Ala Pro
 50 55 60
 Ala Pro Glu Lys Pro Ala
 65 70

<210> 122
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 122
 Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
 1 5 10 15
 Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
 20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Val Lys Glu Lys
35 40 45

Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Thr Gln Pro Pro Ala Pro
50 55 60

Ala Pro Glu Lys Pro Ala
65 70

<210> 123

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 123

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Val Lys Glu Lys
35 40 45

Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Thr Gln Pro Pro Ala Pro
50 55 60

Ala Pro Glu Lys Pro Ala
65 70

<210> 124

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 124

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Val Lys Glu Lys
35 40 45

Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Thr Gln Pro Pro Ala Pro
50 55 60

Ala Pro Glu Lys Pro Ala
65 70

<210> 125

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 125

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Val Lys Glu
35 40 45

Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Glu Lys
50 55 60

Pro Thr Glu Glu Pro Glu
65 70

<210> 126

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 126

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Val Val Lys
35 40 45

Glu Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Lys
50 55 60

Pro Thr Glu Glu Pro Glu

65

70

<210> 127

<211> 69

<212> PRT

<213> Streptococcus pneumoniae

<400> 127

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Val Lys Glu Lys
35 40 45

Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Thr Gln Pro Pro Lys Pro
50 55 60

Thr Glu Glu Pro Glu
65

<210> 128

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 128

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Val Lys Glu
35 40 45

Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Thr Gln Pro Pro Lys
50 55 60

Pro Thr Glu Glu Pro Glu
65 70

<210> 129

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 129

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Val Lys Glu
35 40 45

Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Pro Lys
50 55 60

Pro Thr Glu Glu Pro Glu
65 70

<210> 130
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 130

Asp Ala Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly
1 5 10 15

Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr
20 25 30

Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Val Lys Glu
35 40 45

Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Pro Lys
50 55 60

Pro Thr Glu Glu Pro Glu
65 70

<210> 131
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 131

Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro
1 5 10 15

Glu Lys Pro Ala Pro Ala Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
20 25 30

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Glu Lys Pro Ala
35 40 45

Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Thr
50 55 60

Pro Glu Thr Pro Lys Thr
65 70

<210> 132

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 132

Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro
1 5 10 15

Glu Lys Pro Ala Pro Ala Pro Lys Ala Glu Lys Thr Asp Asp Glu Lys
20 25 30

Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala
35 40 45

Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala
50 55 60

Pro Lys Pro Glu Thr Pro
65 70

<210> 133

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 133

Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro
1 5 10 15

Glu Lys Pro Ala Glu Lys Pro Lys Ala Glu Lys Thr Asp Asp Glu Lys
 20 25 30
 Pro Ala Pro Ala Glu Lys Pro Ala Glu Glu Pro Ala Glu Lys Pro Ala
 35 40 45
 Pro Ala Pro Glu Lys Pro Ala Pro Thr Pro Glu Lys Pro Ala Pro Thr
 50 55 60
 Pro Glu Thr Pro Lys Thr
 65 70

<210> 134
 <211> 67
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 134
 Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Lys Pro
 1 5 10 15
 Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
 20 25 30
 Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
 35 40 45
 Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
 50 55 60
 Pro Lys Thr
 65

<210> 135
 <211> 67
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 135
 Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Lys Pro
 1 5 10 15
 Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
 20 25 30
 Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu

35 40 45
 Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
 50 55 60

Pro Lys Thr
 65

<210> 136
 <211> 67
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 136
 Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Lys Pro
 1 5 10 15

Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
 20 25 30

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
 35 40 45

Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
 50 55 60

Pro Lys Thr
 65

<210> 137
 <211> 67
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 137
 Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Lys Pro
 1 5 10 15

Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
 20 25 30

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
 35 40 45

Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
 50 55 60

Pro Lys Thr
65

<210> 138
<211> 67
<212> PRT
<213> Streptococcus pneumoniae

<400> 138
Asn Pro Ala Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Lys Pro
1 5 10 15
Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln
20 25 30
Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
35 40 45
Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
50 55 60

Pro Lys Thr
65

<210> 139
<211> 64
<212> PRT
<213> Streptococcus pneumoniae

<400> 139
Asn Pro Ala Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Lys Pro
1 5 10 15
Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln
20 25 30
Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
35 40 45
Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
50 55 60

<210> 140

<211> 67

<212> PRT

<213> Streptococcus pneumoniae

<400> 140

Asn Pro Ala Ala Pro Ala Pro Glu Lys Pro Ala Pro Lys Pro Lys Pro
1 5 10 15

Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
20 25 30

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
35 40 45

Ile Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Phe Thr
50 55 60

Pro Lys Thr
65

<210> 141

<211> 67

<212> PRT

<213> Streptococcus pneumoniae

<400> 141

Asn Pro Ala Ala Pro Ala Pro Glu Lys Pro Ala Pro Lys Pro Lys Pro
1 5 10 15

Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Glu Gln Gln
20 25 30

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
35 40 45

Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
50 55 60

Pro Lys Thr
65

<210> 142

<211> 67

<212> PRT

<213> Streptococcus pneumoniae

<400> 142

Asn Pro Ala Ala Pro Lys Ala Glu Lys Pro Ala Pro Ala Pro Lys Pro
1 5 10 15
Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln
20 25 30
Ala Glu Glu Glu Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
35 40 45
Thr Leu Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
50 55 60
Pro Lys Thr
65

<210> 143

<211> 65

<212> PRT

<213> Streptococcus pneumoniae

<400> 143

Asn Pro Ala Ala Pro Lys Ala Glu Lys Pro Ala Pro Ala Pro Lys Pro
1 5 10 15
Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln
20 25 30
Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
35 40 45
Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
50 55 60
Pro
65

<210> 144

<211> 589

<212> PRT

<213> Streptococcus pneumoniae

<400> 144

Glu Gly Val Arg Ser Gly Asn Asn Leu Thr Val Thr Ser Ser Gly Gln

1	5	10	15
Asp Ile Ser Lys Lys Tyr Ala Asp Glu Val Glu Ser His Leu Glu Ser	20	25	30
Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys Val Gln His Thr Gln	35	40	45
Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile Lys Lys Lys Tyr Leu	50	55	60
Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala Glu Leu Thr Ser Lys	65	70	75
Thr Lys Glu Thr Lys Glu Lys Leu Thr Ala Thr Phe Glu Gln Phe Lys	85	90	95
Lys Asp Thr Leu Pro Thr Glu Pro Glu Lys Lys Val Ala Glu Ala Gln	100	105	110
Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Lys	115	120	125
Asp Arg Arg Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu Leu Glu	130	135	140
Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu Val	145	150	155
Lys Val Lys Ala Lys Glu Ser Gln Asp Glu Glu Lys Ile Lys Gln Ala	165	170	175
Glu Ala Glu Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu Lys Lys	180	185	190
Ile Lys Thr Asp Arg Glu Glu Ala Lys Arg Lys Ala Asp Ala Lys Leu	195	200	205
Lys Glu Ala Val Glu Lys Asn Val Ala Thr Ser Glu Gln Asp Lys Pro	210	215	220
Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu Leu Ala Thr Pro Asp	225	230	235
Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu	245	250	255
Thr Leu Pro Ser Pro Ser Leu Asn Met Ala Asn Glu Ser Gln Thr Glu			

260	265	270
His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys Met Leu Ser Glu Ile		
275	280	285
Gln Leu Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys		
290	295	300
Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys		
305	310	315
Glu Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr Lys Ala Glu Leu		
	325	330
		335
Thr Ala Ala Phe Glu Gln Phe Lys Lys Asp Thr Leu Lys Pro Glu Lys		
	340	345
		350
Lys Val Ala Glu Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala		
	355	360
		365
Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr		
	370	375
		380
Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu		
385	390	395
		400
Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Asn Glu Ser Arg Asn Glu		
	405	410
		415
Glu Lys Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu		
	420	425
		430
Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu		
	435	440
		445
Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala Ala Glu Ala		
	450	455
		460
Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala		
465	470	475
		480
Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile		
	485	490
		495
Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro		
	500	505
		510
Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu		

515	520	525
Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu		
530	535	540
Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr		
545	550	555 560
Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu		
565	570	575
Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val Asp Glu		
580	585	

<210> 145
 <211> 21
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 145
 Lys Thr Gly Trp Lys Gln Glu Asn Gly Asn Trp Tyr Phe Tyr Asn Thr
 1 5 10 15
 Asp Gly Ser Met Ala
 20

<210> 146
 <211> 20
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 146
 Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Met
 1 5 10 15
 Gly Ala Met Ala
 20

<210> 147
 <211> 20
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 147
 Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn

1	5	10	15
---	---	----	----

Gly Ser Met Ala
20

<210> 148
 <211> 20
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 148
 Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
 1 5 10 15

Gly Ala Met Ala
20

<210> 149
 <211> 20
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 149
 Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
 1 5 10 15

Gly Asp Met Ala
20

<210> 150
 <211> 20
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 150
 Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn
 1 5 10 15

Gly Ala Met Ala
20

<210> 151
 <211> 20
 <212> PRT

<213> Streptococcus pneumoniae

<400> 151

Thr	Gly	Trp	Leu	Gln	Tyr	Asn	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn
1				5					10					15	

Gly Asp Met Ala
20

<210> 152

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 152

Thr	Gly	Trp	Leu	Gln	Asn	Asn	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn
1				5					10					15	

Gly Asp Met Ala
20

<210> 153

<211> 19

<212> PRT

<213> Streptococcus pneumoniae

<400> 153

Thr	Gly	Trp	Leu	Gln	Tyr	Asn	Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn	Gly
1				5					10					15	

Asp Met Ala

<210> 154

<211> 21

<212> PRT

<213> Streptococcus pneumoniae

<400> 154

Thr	Gly	Trp	Val	Lys	Asp	Gly	Asp	Thr	Trp	Tyr	Tyr	Leu	Glu	Ala	Ser
1				5					10					15	

Gly Ala Met Lys Ala
20

<210> 155

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 155

Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Ser

1

5

10

15

Gly Ala Leu Ala

20

<210> 156

<211> 18

<212> PRT

<213> Streptococcus pneumoniae

<400> 156

Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn Ala Asn Gly Glu Trp

1

5

10

15

Val Asn

<210> 157

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 157

Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn

1

5

10

15

Gly Ala Met Ala

20

<210> 158

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 158

Thr Gly Trp Leu Gln Xaa Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn

1

5

10

15

Gly Ala Met Ala
20

<210> 159
<211> 17
<212> PRT
<213> Streptococcus pneumoniae

<400> 159
Val Asn Thr Thr Val Asp Gly Tyr Lys Val Asn Ala Asn Gly Glu Trp
1 5 10 15

Val

<210> 160
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 160
Ile Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp
1 5 10 15

Gly Ser Met Ala
20

<210> 161
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 161
Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 162
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 162

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 163

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 163

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 164

<211> 21

<212> PRT

<213> Streptococcus pneumoniae

<400> 164

0 Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala
1h l r e 5l y s l e 10r y y e s 15l

<210> 165

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 165

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Asp Met Ala
20

<210> 166

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 166

Thr	Gly	Trp	Ala	Lys	Val	His	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn
1				5					10					15	

Gly	Ser	Met	Ala
			20

<210> 167

<211> 21

<212> PRT

<213> Streptococcus pneumoniae

<400> 167

Thr	Gly	Trp	Val	Lys	Asp	Gly	Glu	Thr	Trp	Tyr	Tyr	Leu	Glu	Ala	Ser
1				5					10					15	

Gly	Ser	Met	Lys	Ala
				20

<210> 168

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 168

Asn	Gln	Trp	Phe	Gln	Val	Ser	Asp	Lys	Trp	Tyr	Tyr	Val	Asn	Gly	Leu
1				5					10					15	

Gly	Ser	Leu	Ser
			20

<210> 169

<211> 17

<212> PRT

<213> Streptococcus pneumoniae

<400> 169

Val	Asn	Thr	Thr	Val	Asp	Gly	Tyr	Lys	Val	Asn	Ala	Asn	Gly	Glu	Trp
1				5					10					15	

Val

<210> 170

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 170

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn

1

5

10

15

Gly Ser Met Ala

20

<210> 171

<211> 21

<212> PRT

<213> Streptococcus pneumoniae

<400> 171

Lys Thr Gly Trp Lys Gln Glu Asn Gly Asn Trp Tyr Phe Tyr Asn Thr

1

5

10

15

Asp Gly Ser Met Ala

20

<210> 172

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 172

Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp

1

5

10

15

Gly Ser Met Ala

20

<210> 173

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 173

Ile Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp

1

5

10

15

Gly Ser Met Ala
20

<210> 174
<211> 21
<212> PRT
<213> Streptococcus pneumoniae

<400> 174
Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser
1 5 10 15

Gly Ala Met Lys Ala
20

<210> 175
<211> 21
<212> PRT
<213> Streptococcus pneumoniae

<400> 175
Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser
1 5 10 15

Gly Ala Met Lys Ala
20

<210> 176
<211> 21
<212> PRT
<213> Streptococcus pneumoniae

<400> 176
Thr Gly Trp Val Lys Asp Gly Glu Thr Trp Tyr Tyr Leu Glu Ala Ser
1 5 10 15

Gly Ser Met Lys Ala
20

<210> 177
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 177

Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Ser
1 5 10 15

Gly Ala Leu Ala
20

<210> 178

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 178

Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Leu
1 5 10 15

Gly Ala Leu Ala
20

<210> 179

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 179

Asn Gln Trp Phe Gln Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Leu
1 5 10 15

Gly Ser Leu Ser
20

<210> 180

<211> 18

<212> PRT

<213> Streptococcus pneumoniae

<400> 180

Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn Ala Asn Gly Glu Trp
1 5 10 15

Val Asn

<210> 181
<211> 17
<212> PRT
<213> Streptococcus pneumoniae

<400> 181
Val Asn Thr Thr Val Asp Gly Tyr Lys Val Asn Ala Asn Gly Glu Trp
1 5 10 15

Val

<210> 182
<211> 17
<212> PRT
<213> Streptococcus pneumoniae

<400> 182
Val Asn Thr Thr Val Asp Gly Tyr Lys Val Asn Ala Asn Gly Glu Trp
1 5 10 15

Val

<210> 183
<211> 539
<212> PRT
<213> Streptococcus pneumoniae

<400> 183
Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
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Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
35 40 45

Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
50 55 60

Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg
65 70 75 80

Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile

85					90					95					
Lys	Thr	Lys	Tyr	Leu	Arg	Glu	Leu	Asn	Val	Leu	Glu	Glu	Lys	Ser	Lys
			100					105					110		
Asp	Glu	Leu	Pro	Ser	Glu	Ile	Lys	Ala	Lys	Leu	Asp	Ala	Ala	Phe	Glu
		115					120					125			
Lys	Phe	Lys	Lys	Asp	Thr	Leu	Lys	Pro	Gly	Glu	Lys	Val	Ala	Glu	Ala
	130					135					140				
Lys	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Glu	Asp	Gln	Lys	Glu
145				150					155					160	
Glu	Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Asn	Thr	Tyr	Lys	Thr	Leu	Glu	Leu
				165				170					175		
Glu	Ile	Ala	Glu	Phe	Asp	Val	Lys	Val	Lys	Glu	Ala	Glu	Leu	Glu	Leu
		180					185						190		
Val	Lys	Glu	Glu	Ala	Lys	Glu	Phe	Arg	Asn	Glu	Gly	Thr	Ile	Lys	Gln
	195					200					205				
Ala	Lys	Glu	Lys	Val	Glu	Ser	Lys	Lys	Ala	Glu	Ala	Thr	Arg	Leu	Glu
	210					215					220				
Asn	Ile	Lys	Thr	Asp	Arg	Lys	Lys	Ala	Glu	Glu	Glu	Ala	Lys	Arg	Lys
225				230					235					240	
Ala	Ala	Glu	Glu	Asp	Lys	Val	Lys	Glu	Lys	Pro	Ala	Glu	Gln	Pro	Gln
				245				250					255		
Pro	Ala	Pro	Ala	Thr	Gln	Pro	Glu	Lys	Pro	Ala	Pro	Lys	Pro	Glu	Lys
			260				265					270			
Pro	Ala	Glu	Gln	Pro	Lys	Ala	Glu	Lys	Thr	Asp	Asp	Gln	Gln	Ala	Glu
	275					280					285				
Glu	Asp	Tyr	Ala	Arg	Arg	Ser	Glu	Glu	Glu	Tyr	Asn	Arg	Leu	Thr	Gln
	290					295					300				
Gln	Gln	Pro	Pro	Lys	Thr	Glu	Lys	Pro	Ala	Gln	Pro	Ser	Thr	Pro	Lys
305				310					315					320	
Thr	Gly	Trp	Lys	Gln	Glu	Asn	Gly	Met	Trp	Tyr	Phe	Tyr	Asn	Thr	Asp
			325				330					335			
Gly	Ser	Met	Ala	Thr	Gly	Trp	Leu	Gln	Asn	Asn	Gly	Ser	Trp	Tyr	Tyr

340	345	350
Leu Asn Ala Asn Gly Ala Met Ala Thr Gly Trp Leu Gln Asn Asn Gly		
355	360	365
Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser Met Ala Thr Gly Trp Leu		
370	375	380
Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ala Met Ala		
385	390	395 400
Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn		
405	410	415
Gly Ala Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr		
420	425	430
Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly		
435	440	445
Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu		
450	455	460
Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala		
465	470	475 480
Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Thr Ser		
485	490	495
Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr		
500	505	510
Tyr Val His Gly Ser Ser Ala Leu Ala Ile Asn Thr Thr Val Tyr Gly		
515	520	525
Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn		
530	535	

<210> 184

<211> 1620

<212> DNA

<213> Streptococcus pneumoniae

<400> 184

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gaggggaagta cccaagcagc cacttcttct aatatggcaa agacagaaca taggaaagct 180

gctaaacaag tcgtcgatga atatataaga aaaatgttga gggagattca actagataga 240
agaaaacata cccaaaatgt cgccttaaac ataaagttga ggcgaattaa aacgaagtat 300
ttgCGTgaat taaatgtttt agaagagaag tcgaaagatg agttgCGtc agaaataaaa 360
gcaaagttag acgcagcttt tgagaagttt aaaaaagata cattgaaacc aggagaaaag 420
gtagcagaag ctaagaagaa ggttgaagaa gctaagaaaa aagccgagga tcaaaaagaa 480
gaagatcgtc gtaactaccc aaccaatact tacaaaacgc ttgaacttga aattgctgag 540
ttcgatgtga aagttaaaga agcggagctt gaactagtaa aagaggaagc taaagaattt 600
cgaaacgagg gcacaattaa gcaagcaaaa gagaaagttg agagtataaa agctgaggct 660
acaagggttag aaacatcaa gacagatcgt aaaaaagcag aagaagaagc taaacgaaaa 720
gcagcagaag aagataaagt taaagaaaaa ccagctgaac aaccacaacc agcgccggct 780
actcaaccag aaaaaccagc tccaaaacca gagaagccag ctgaacaacc aaaagcagaa 840
aaaacagatg atcaacaagc tgaagaagac tatgctcgta gatcagaaga agaataataat 900
cgcttgactc aacagcaacc gccaaaaact gaaaaaccag cacaaccatc tactccaaaa 960
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gcaagccaat ggttcaaagt atcagataaa tgggtactatg tccatggctc aagtgcctt 1560
gcaatcaaca caactgtata tggctatgga gtcaatgcc atggtgaatg ggtaactaa 1620

<210> 185

<211> 581

<212> PRT

<213> Streptococcus pneumoniae

<400> 185

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
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Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
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Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
35 40 45

Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
50 55 60

Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg
65 70 75 80

Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile
85 90 95

Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys Ser Lys
 100 105 110
 Asp Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu
 115 120 125
 Lys Phe Lys Lys Asp Thr Leu Lys Pro Gly Glu Lys Val Ala Glu Ala
 130 135 140
 Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu
 145 150 155 160
 Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu
 165 170 175
 Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu
 180 185 190
 Val Lys Glu Glu Ala Lys Glu Ser Arg Asn Glu Gly Thr Ile Lys Gln
 195 200 205
 Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu
 210 215 220
 Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys
 225 230 235 240
 Ala Asp Ala Lys Leu Lys Glu Ala Asn Val Ala Thr Ser Asp Gln Gly
 245 250 255
 Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu Leu Ala Thr
 260 265 270
 Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly
 275 280 285
 Glu Glu Thr Leu Pro Ser Ser Ser Leu Lys Ser Gly Lys Lys Val Ala
 290 295 300
 Glu Ala Glu Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln
 305 310 315 320
 Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu
 325 330 335
 Asp Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu
 340 345 350

Glu Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu Lys Ile
 355 360 365

Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg
 370 375 380

Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys
 385 390 395 400

Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln
 405 410 415

Pro Gln Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro
 420 425 430

Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
 435 440 445

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
 450 455 460

Ile Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Phe Thr
 465 470 475 480

Pro Lys Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn
 485 490 495

Thr Asp Gly Ser Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp
 500 505 510

Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Val Lys Asp
 515 520 525

Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala Met Lys Ala Ser
 530 535 540

Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Ser Gly
 545 550 555 560

Ala Leu Ala Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn Ala Asn
 565 570 575

Gly Glu Trp Val Asn
 580

<210> 186

<211> 1746

<212> DNA

<213> Streptococcus pneumoniae

<400> 186

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gagggaagtâ cccaagcagc cacttcttct aatatggcaa agacagaaca taggaaagct 180
gctaaacaag tcgtcgatga atatatagaa aaaatgttga gggagattca actagataga 240
agaaaacata cccaaaatgt cgccttaaac ataaagttga gcgcaattaa aacgaagtat 300
ttgcgatgaat taaatgtttt agaagagaag tcgaaagatg agttgccgctc agaaataaaa 360
gcaaagtttag acgcagcttt tgagaagttt aaaaaagata cattgaaacc aggagaaaag 420
gtagcagaag ctaagaagaa ggttgaagaa gctaagaaaa aagccgagga tcaaaaagaa 480
gaagatcgct gtaactaccc aaccaatact taaaaacgc ttgaacttga aattgctgag 540
ttcgatgtga aagttaaaga agcggagctt gaactagtaa aagaggaagc taaagaatct 600
cgaaacgagg gcacaattaa gcaagcaaaa gagaaagttg agagtaaaaa agctgaggct 660
acaaggtttag aaacatcaa gacagatcgt aaaaaagcag aagaagaagc taaacgaaaa 720
gcagatgcta agttgaagga agctaatagt gcgacttcag atcaaggtaa accaaagggg 780
cgggcaaaac gaggagttcc tggagagcta gcaacacctg ataaaaaaga aaatgatgctg 840
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gcccttgcat tcaacacaac tgtagatggc tatggagtca atgccaatgg tgaatgggta 1740
aactaa 1746
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<210> 187

<211> 663

<212> PRT

<213> Streptococcus pneumoniae

<400> 187

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Thr Glu His Arg Lys Ala Ala Lys Gln Val Val Asp Glu Tyr Ile Glu
    20                      25                      30
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Lys Met Leu Arg Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn
 35 40 45
 Val Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg
 50 55 60
 Glu Leu Asn Val Leu Glu Glu Lys Ser Lys Asp Glu Leu Pro Ser Glu
 65 70 75 80
 Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr
 85 90 95
 Leu Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val Glu Glu
 100 105 110
 Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr
 115 120 125
 Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp
 130 135 140
 Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys
 145 150 155 160
 Glu Ser Arg Asn Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu
 165 170 175
 Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg
 180 185 190
 Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp Ala Lys Leu Lys
 195 200 205
 Glu Ala Asn Val Ala Thr Ser Asp Gln Gly Lys Pro Lys Gly Arg Ala
 210 215 220
 Lys Arg Gly Val Pro Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn
 225 230 235 240
 Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu Thr Leu Pro Ser
 245 250 255
 Ser Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys Lys Val
 260 265 270
 Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg
 275 280 285

Asn	Tyr	Pro	Thr	Asn	Thr	Tyr	Lys	Thr	Leu	Asp	Leu	Glu	Ile	Ala	Glu	290	295	300	
Ser	Asp	Val	Lys	Val	Lys	Glu	Ala	Glu	Leu	Glu	Leu	Val	Lys	Glu	Glu	305	310	315	320
Ala	Lys	Glu	Pro	Arg	Asp	Glu	Glu	Lys	Ile	Lys	Gln	Ala	Lys	Ala	Lys	325	330	335	
Val	Glu	Ser	Lys	Lys	Ala	Glu	Ala	Thr	Arg	Leu	Glu	Asn	Ile	Lys	Thr	340	345	350	
Asp	Arg	Lys	Lys	Ala	Glu	Glu	Glu	Ala	Lys	Arg	Lys	Ala	Ala	Glu	Glu	355	360	365	
Asp	Lys	Val	Lys	Glu	Lys	Pro	Ala	Glu	Gln	Pro	Gln	Pro	Ala	Pro	Ala	370	375	380	
Thr	Gln	Pro	Glu	Lys	Pro	Ala	Pro	Lys	Pro	Glu	Lys	Pro	Ala	Glu	Gln	385	390	395	400
Pro	Lys	Ala	Glu	Lys	Thr	Asp	Asp	Gln	Gln	Ala	Glu	Glu	Asp	Tyr	Ala	405	410	415	
Arg	Arg	Ser	Glu	Glu	Glu	Tyr	Asn	Arg	Leu	Thr	Gln	Gln	Gln	Pro	Pro	420	425	430	
Lys	Thr	Glu	Lys	Pro	Ala	Gln	Pro	Ser	Thr	Pro	Lys	Thr	Gly	Trp	Lys	435	440	445	
Gln	Glu	Asn	Gly	Met	Trp	Tyr	Phe	Tyr	Asn	Thr	Asp	Gly	Ser	Met	Ala	450	455	460	
Thr	Gly	Trp	Leu	Gln	Asn	Asn	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn	465	470	475	480
Gly	Ala	Met	Ala	Thr	Gly	Trp	Leu	Gln	Asn	Asn	Gly	Ser	Trp	Tyr	Tyr	485	490	495	
Leu	Asn	Ala	Asn	Gly	Ser	Met	Ala	Thr	Gly	Trp	Leu	Gln	Asn	Asn	Gly	500	505	510	
Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn	Gly	Ala	Met	Ala	Thr	Gly	Trp	Leu	515	520	525	
Gln	Tyr	Asn	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ser	Asn	Gly	Ala	Met	Ala	530	535	540	

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
545 550 555 560

Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr
565 570 575

Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly
580 585 590

Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Val
595 600 605

Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala Met Lys
610 615 620

Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly
625 630 635 640

Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn
645 650 655

Ala Asn Gly Glu Trp Val Asn
660

<210> 188

<211> 2480

<212> DNA

<213> Streptococcus pneumoniae

<400> 188

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gatagaagaa aacataccca aaatgtcgcc ttaaacataa agttgagcgc aattaaaacg 180
aagtatttgc gtgaattaaa tgttttagaa gagaagtcga aagatgagtt gccgtcagaa 240
ataaaagcaa agttagacgc agcttttgag aagtttaaaa aagatacatt gaaaccagga 300
gaaaaggtag cagaagctaa gaagaaggtt gaagaagcta agaaaaagc cgaggatcaa 360
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gctgagttcg atgtgaaagt taaagaagcg gagcttgaac tagtaaaaga ggaagctaaa 480
gaatctcgaa acgagggcac aattaagcaa gcaaaagaga aagttgagag taaaaaagct 540
gaggctacaa ggtagaaaa catcaagaca gatcgtaaaa aagcagaaga agaagctaaa 600
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<210> 189

<211> 929

<212> PRT

<213> Streptococcus pneumoniae

<400> 189

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 20 25 30

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 35 40 45

Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala Asp Glu Val Glu
 50 55 60

Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys
 65 70 75 80

Val Gln His Thr Gln Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile

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100					105					110						
Glu	Leu	Thr	Ser	Lys	Thr	Lys	Glu	Thr	Lys	Glu	Lys	Leu	Thr	Ala	Thr	
115					120					125						
Phe	Glu	Gln	Phe	Lys	Lys	Asp	Thr	Leu	Pro	Thr	Glu	Pro	Glu	Lys	Lys	
130					135					140						
Val	Ala	Glu	Ala	Gln	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Glu	
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Asp	Gln	Lys	Glu	Lys	Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Ile	Thr	Tyr	Lys	
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Thr	Leu	Glu	Leu	Glu	Ile	Ala	Glu	Ser	Asp	Val	Glu	Val	Lys	Lys	Ala	
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210					215					220						
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290					295					300						
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Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Val Glu Glu		
385	390	395
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Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr		
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Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp		
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Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Asn		
435	440	445
Glu Ser Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys Glu Lys Val Glu		
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Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg		
465	470	475
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Lys Ala Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu		
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Glu Ala Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys		
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Glu Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu		
530	535	540
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545	550	555
560		
Leu Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala		
565	570	575
Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn		
580	585	590
Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu		

595	600	605
Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val 610 615 620		
Asp Glu Pro Glu Thr Pro Ala Pro Ala Pro Gln Pro Ala Pro Ala Pro 625 630 635 640		
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Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly 820 825 830		
Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn Gly Ala 835 840 845		
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Ala Asn Gly Ser Met	Ala Thr Asp Trp Val	Lys Asp Gly Asp Thr Trp		
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Asn

<210> 190
 <211> 3463
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 190

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<210> 191

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 191

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys

1

5

10

15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly

20

25

30

Gly Val Val His Ala Glu Gly Val Arg Gly Ile Thr Gln Ser Gly Asn

35 40 45
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 50 55 60

Asp Glu Val Glu Ser Pro
 65 70

<210> 192
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 192
 Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
 20 25 30

Gly Val Val His Ala Glu Gly Val Arg Gly Ile Thr Gln Ser Gly Asn
 35 40 45

Asn Leu Thr Val Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala
 50 55 60

Asp Glu Val Glu Ser Pro
 65 70

<210> 193
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 193
 Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
 20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ile Thr Gln Val Ala Thr
 35 40 45

Ser Tyr Asn Lys Ala Asn Glu Ser Gln Thr Glu His Arg Lys Ala Ala
 50 55 60

Lys Gln Val Asp Glu Pro
65 70

<210> 194
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 194
Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ile Thr Gln Asn Glu Gly
35 40 45

Ser Thr Gln Ala Ala Thr Ser Ser Asn Met Ala Lys Thr Glu His Arg
50 55 60

Lys Gln Val Asp Glu Pro
65 70

<210> 195
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

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Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
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Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
20 25 30

Gly Val Val His Ala Glu Gly Val Arg Gly Ile Thr Gln Ser Glu Asn
35 40 45

Thr Pro Lys Val Thr Ser Ser Gly Asn Met Ala Lys Thr Glu His Arg
50 55 60

Lys Gln Val Asp Glu Pro
65 70

<210> 196
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 196
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20 25 30
Ser Val Val His Ala Thr Gly Val Glu Gly Ile Thr Gln Lys Glu Val
35 40 45
Thr Thr Gln Val Ala Thr Ser Phe Asn Lys Ala Asn Lys Ser Gln Thr
50 55 60
Glu His Met Asp Glu Pro
65 70

<210> 197
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 197
Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15
Phe Ser Val Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30
Ser Val Val His Ala Thr Glu Val Glu Gly Ile Thr Gln Asn Glu Gly
35 40 45
Ala Thr Gln Val Pro Thr Ser Ser Asn Arg Ala Asn Glu Ser Gln Ala
50 55 60
Glu Gln Gly Glu Gln Pro
65 70

<210> 198
<211> 70
<212> PRT

<213> Streptococcus pneumoniae

<400> 198

Lys Lys Leu Asp Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys
1 5 10 15

Asn Leu Lys Lys Val Gln Ser Glu Ser Tyr Ala Lys Ser Thr Lys Lys
20 25 30

Arg His Thr Gln Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile Lys
35 40 45

Lys Lys Tyr Leu Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala Glu
50 55 60

Leu Thr Ser Lys Thr Lys
65 70

<210> 199

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 199

Lys Lys Leu Asp Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys
1 5 10 15

Asn Leu Lys Lys Val Gln Ser Glu Ser Tyr Ala Lys Ser Thr Lys Lys
20 25 30

Arg His Thr Gln Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile Lys
35 40 45

Lys Lys Tyr Leu Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala Glu
50 55 60

Leu Thr Ser Lys Thr Lys
65 70

<210> 200

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 200

Lys Lys Leu Asp Ser Asp Ile Lys Lys Met Leu Ser Glu Ile Gln Glu

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Tyr Ile Lys Lys Met Leu Ser Glu Ser Tyr Ile Gln Leu Asp Lys Arg			
20	25	30	
Lys His Thr Gln Asn Val Asn Leu Asn Arg Lys Leu Ser Ala Ile Gln			
35	40	45	
Thr Lys Tyr Leu Tyr Glu Leu Arg Val Leu Lys Glu Ser Lys Ser Lys			
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Lys Glu Glu Leu Thr Ser			
65	70		

<210> 201
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 201
Lys Lys Leu Asp Ser Asp Ile Lys Ala Ala Lys Gln Val Val Asp Glu
1 5 10 15
Tyr Ile Glu Lys Met Leu Arg Glu Ser Tyr Ile Gln Leu Asp Arg Arg
20 25 30
Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys
35 40 45
Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Ser Glu Lys Ser
50 55 60
Lys Asp Glu Leu Pro Ser
65 70

<210> 202
 <211> 70
 <212> PRT
 <213> Streptocarpus holstii

<400> 202
Lys Lys Leu Asp Ser Asp Ile Lys Ala Ala Lys Asp Glu Val Asp Glu
1 5 10 15
Tyr Ile Lys Lys Met Leu Ser Glu Ser Tyr Ile Gln Leu Asp Lys Arg
20 25 30

Lys His Thr His Asn Phe Ala Leu Asn Leu Lys Leu Ser Arg Ile Lys
35 40 45

Thr Glu Tyr Leu Tyr Lys Leu Lys Val Asn Val Leu Glu Glu Lys Ser
50 55 60

Lys Ala Glu Leu Thr Ser
65 70

<210> 203

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 203

Lys Lys Leu Asp Ser Asp Ile Lys Lys Ala Ala Lys Gln Val Asp Glu
1 5 10 15

Tyr Ile Thr Lys Lys Leu Ser Glu Ser Tyr Ile Gln Leu Asp Arg Arg
20 25 30

Lys His Thr Gln Asn Val Gly Leu Leu Thr Lys Leu Gly Val Ile Lys
35 40 45

Thr Glu Tyr Leu His Arg Leu Ser Val Ser Val Leu Lys Glu Lys Ser
50 55 60

Glu Ala Glu Leu Pro Ser
65 70

<210> 204

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 204

Lys Lys Leu Asp Ser Glu Arg Asp Lys Ala Arg Lys Glu Val Glu Glu
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Tyr Val Lys Lys Ile Val Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys
20 25 30

Arg His Thr Ile Thr Val Ala Leu Val Asn Glu Leu Asn Asn Ile Lys
35 40 45

Asn Glu Tyr Leu Asn Lys Ile Val Glu Ser Val Thr Ser Glu Ser Gln
 50 55 60

Leu Gln Ile Leu Met Met
 65 70

<210> 205

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 205

Glu Thr Lys Glu Lys Leu Thr Ala Thr Phe Glu Gln Phe Lys Lys Asp
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Thr Leu Ser Ser Ser Ser Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser
 20 25 30

Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro Glu Lys Lys Val Ala
 35 40 45

Glu Ala Gln Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln
 50 55 60

Lys Glu Lys Asp Arg Arg
 65 70

<210> 206

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 206

Glu Thr Lys Glu Lys Leu Thr Ala Thr Phe Glu Gln Phe Lys Lys Asp
 1 5 10 15

Thr Leu Ser Ser Ser Ser Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser
 20 25 30

Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro Glu Lys Lys Val Ala
 35 40 45

Glu Ala Gln Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln
 50 55 60

Lys Glu Lys Asp Arg Arg

65

70

<210> 207

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 207

Lys Thr Lys Lys Glu Leu Asp Ala Ala Phe Glu Lys Phe Lys Lys Glu
 1 5 10 15

Thr Leu Ser Ser Ser Ser Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser
 20 25 30

Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro Glu Lys Lys Val Pro
 35 40 45

Glu Leu Thr Lys Lys Leu Ala Glu Ala Lys Gln Lys Ala Lys Ala Gln
 50 55 60

Lys Glu Glu Asp Phe Arg
 65 70

<210> 208

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 208

Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp
 1 5 10 15

Thr Leu Lys Ser Ser Ser Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser
 20 25 30

Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro Gly Glu Lys Val Ala
 35 40 45

Glu Ala Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln
 50 55 60

Lys Glu Glu Asp Arg Arg
 65 70

<210> 209

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 209
Lys Thr Lys Lys Glu Val Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp
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Thr Leu Lys Leu Ser Ser Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser
20 25 30
Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro Gly Glu Lys Val Ala
35 40 45
Glu Ala Gln Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Lys Asp Gln
50 55 60
Lys Glu Glu Asp His Arg
65 70

<210> 210
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 210
Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Gln Phe Lys Lys Asp
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Thr Leu Lys Leu Ser Ser Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser
20 25 30
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35 40 45
Glu Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln
50 55 60
Lys Glu Glu Asp Arg Arg
65 70

<210> 211
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 211

Glu Ser Arg Ser Lys Val Asp Glu Ala Val Ser Lys Phe Glu Lys Asp
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Ser Ser Ser Ser Ser Ser Ser Asp Ser Ser Thr Lys Pro Glu Ala Ser
20 25 30

Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro Gly Glu Lys Val Ala
35 40 45

Glu Ala Lys Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln
50 55 60

Lys Glu Glu Asp Arg Arg
65 70

<210> 212

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 212

Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu
1 5 10 15

Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu Val Lys Val Lys
20 25 30

Ala Lys Glu Ser Gln Asp Glu Glu Lys Ile Lys Gln Ala Glu Ala Glu
35 40 45

Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr
50 55 60

Asp Arg Glu Gln Ala Glu
65 70

<210> 213

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 213

Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu
1 5 10 15

Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu Val Lys Val Lys
20 25 30

Ala Lys Glu Ser Gln Asp Glu Glu Lys Ile Lys Gln Ala Glu Ala Glu
35 40 45

Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr
50 55 60

Asp Arg Glu Gln Ala Glu
65 70

<210> 214
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 214
Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu
1 5 10 15

Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu
20 25 30

Ala Lys Pro Ser Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys
35 40 45

Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Glu Ile Lys Thr
50 55 60

Glu Arg Lys Gln Ala Glu
65 70

<210> 215
<211> 70
<212> PRT
<213> Streptocarpus holstii

<400> 215
Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu
1 5 10 15

Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu
20 25 30

Ala Lys Glu Ser Arg Asn Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys

35 40 45
Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr
50 55 60

Asp Arg Lys Gln Ala Glu
65 70

<210> 216
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 216
Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu
1 5 10 15

Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Lys Glu Glu
20 25 30

Ala Lys Glu Thr Arg Asn Glu Asp Thr Ile Asn Gln Ala Lys Ala Lys
35 40 45

Val Lys Ser Glu Gln Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr
50 55 60

Asp Arg Glu Gln Ala Glu
65 70

<210> 217
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 217
Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu
1 5 10 15

Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu Val Lys Glu Glu
20 25 30

Ala Lys Gly Ser Arg Asn Glu Gln Lys Val Asn Gln Ala Lys Ala Lys
35 40 45

Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr
50 55 60

Asp Arg Glu Gln Ala Glu
65 70

<210> 218
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 218
Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu
1 5 10 15

Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu Val Lys Val Lys
20 25 30

Ala Asn Glu Pro Arg Asp Glu Gln Lys Ile Lys Gln Ala Glu Ala Glu
35 40 45

Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr
50 55 60

Asp Arg Glu Gln Ala Glu
65 70

<210> 219
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 219
Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu
1 5 10 15

Ala Lys Arg Lys Ala Asp Ala Lys Leu Lys Lys Ala Glu Ala Val Glu
20 25 30

Lys Asn Val Ala Thr Ser Glu Gln Asp Lys Pro Lys Arg Arg Ala Lys
35 40 45

Arg Gly Val Ser Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp
50 55 60

Ala Lys Ser Ser Asp Ser
65 70

<210> 220
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 220
 Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu
 1 5 10 15
 Ala Lys Arg Lys Ala Asp Ala Lys Leu Lys Lys Ala Glu Ala Val Glu
 20 25 30
 Lys Asn Val Ala Thr Ser Glu Gln Asp Lys Pro Lys Arg Arg Ala Lys
 35 40 45
 Arg Gly Val Ser Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp
 50 55 60
 Ala Lys Ser Ser Asp Ser
 65 70

<210> 221
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 221
 Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Ala Glu Glu Glu
 1 5 10 15
 Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala Ala Glu Ala Lys
 20 25 30
 Gln Lys Val Asp Thr Lys Glu Gln Gly Lys Pro Lys Arg Arg Ala Lys
 35 40 45
 Arg Gly Val Ser Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp
 50 55 60
 Ala Lys Ser Ser Asp Ser
 65 70

<210> 222
 <211> 70
 <212> PRT

<213> Streptococcus pneumoniae

<400> 222

Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Ala Glu Glu Glu
1 5 10 15

Ala Lys Arg Lys Ala Asp Gly Lys Leu Lys Lys Ala Ala Glu Ala Glu
20 25 30

Ala Asn Val Ala Thr Ser Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys
35 40 45

Arg Gly Val Pro Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp
50 55 60

Ala Lys Ser Ser Asp Ser
65 70

<210> 223

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 223

Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu
1 5 10 15

Ala Lys Arg Lys Ala Glu Ala Glu Glu Val Lys Ala Ala Glu Ala Glu
20 25 30

Ala Asn Val Ala Thr Ser Asp Lys Asp Lys Leu Lys Arg Arg Thr Lys
35 40 45

Arg Ala Val Pro Gly Glu Pro Ala Thr Pro Asp Lys Lys Glu Asn Asp
50 55 60

Ala Lys Ser Ser Asp Ser
65 70

<210> 224

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 224

Thr Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu

1 5 10 15
 Ala Lys Arg Lys Ala Asp Ala Lys Glu Val Lys Ala Ala Glu Ala Glu
 20 25 30
 Ala Asn Val Ala Thr Ser Asp Gln Asp Glu Ser Lys Arg Arg Val Lys
 35 40 45
 Gly Gly Val Pro Gly Glu Gln Ala Thr Leu Asp Lys Lys Glu Asn Asp
 50 55 60
 Ala Lys Ser Ser Asp Ser
 65 70

<210> 225
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 225
 Thr Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Ala Glu Glu Glu
 1 5 10 15
 Ala Lys Arg Arg Ala Asp Ala Lys Glu Val Lys Ala Ala Glu Ala Glu
 20 25 30
 Ala Asn Val Ala Thr Ser Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys
 35 40 45
 Arg Gly Val Pro Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp
 50 55 60
 Ala Lys Ser Ser Asp Ser
 65 70

<210> 226
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 226
 Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu Asn Met Ala Asn
 1 5 10 15
 Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys
 20 25 30

Met Leu Ser Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn Val
 35 40 45

Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu
 50 55 60

Leu Ser Val Leu Lys Glu
 65 70

<210> 227

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 227

Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu Asn Met Ala Asn
 1 5 10 15

Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys
 20 25 30

Met Leu Ser Glu Ile Gln Leu Asp Gly Arg Lys His Thr Pro Asn Val
 35 40 45

Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu
 50 55 60

Leu Ser Val Leu Lys Glu
 65 70

<210> 228

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 228

Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu Asn Met Ala Asn
 1 5 10 15

Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys
 20 25 30

Met Leu Ser Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn Val
 35 40 45

Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu
 50 55 60

Leu Ser Val Leu Lys Glu
 65 70

<210> 229

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 229

Ser Val Gly Glu Glu Thr Leu Pro Ser Ser Ser Leu Asn Met Ala Asn
 1 5 10 15

Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys
 20 25 30

Met Leu Ser Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn Val
 35 40 45

Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu
 50 55 60

Leu Ser Val Leu Lys Glu
 65 70

<210> 230

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 230

Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Ser Leu Asn Met Ala Asn
 1 5 10 15

Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys
 20 25 30

Met Leu Ser Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn Val
 35 40 45

Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu
 50 55 60

Leu Ser Val Leu Lys Glu

65

70

<210> 231

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 231

Val	Gly	Glu	Glu	Thr	Leu	Pro	Ser	Pro	Ser	Ser	Leu	Asn	Met	Ala	Asn
1				5				10					15		

Glu	Ser	Gln	Thr	Glu	His	Arg	Lys	Asp	Val	Asp	Glu	Tyr	Ile	Lys	Lys
			20					25					30		

Met	Leu	Ser	Glu	Ile	Gln	Leu	Asp	Arg	Arg	Lys	His	Thr	Gln	Asn	Val
		35					40					45			

Asn	Leu	Asn	Ile	Lys	Leu	Ser	Ala	Ile	Lys	Thr	Lys	Tyr	Leu	Tyr	Glu
	50					55					60				

Leu	Ser	Val	Leu	Lys	Glu
65				70	

<210> 232

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 232

Val	Gly	Glu	Glu	Thr	Leu	Pro	Ser	Pro	Ser	Ser	Leu	Asn	Met	Ala	Asn
1				5				10					15		

Glu	Ser	Gln	Thr	Glu	His	Arg	Lys	Asp	Val	Asp	Glu	Tyr	Ile	Lys	Lys
			20					25					30		

Met	Leu	Ser	Glu	Ile	Gln	Leu	Asp	Arg	Arg	Lys	His	Thr	Gln	Asn	Val
		35					40					45			

Asn	Leu	Asn	Ile	Lys	Leu	Ser	Ala	Ile	Lys	Thr	Lys	Tyr	Leu	Tyr	Glu
	50					55					60				

Leu	Ser	Val	Leu	Lys	Glu
65				70	

<210> 233

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 233

Asn	Ser	Lys	Lys	Glu	Glu	Leu	Thr	Ser	Lys	Thr	Lys	Ala	Glu	Leu	Thr
1				5					10					15	
Ala	Ala	Phe	Glu	Gln	Phe	Lys	Lys	Asp	Thr	Leu	Lys	Pro	Glu	Lys	Lys
			20					25					30		
Val	Ala	Glu	Ala	Glu	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Lys
			35				40					45			
Asp	Gln	Lys	Glu	Glu	Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Asn	Thr	Tyr	Lys
		50					55				60				
Thr	Leu	Glu	Leu	Glu	Ile										
65					70										

<210> 234
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 234

Asn	Ser	Lys	Lys	Glu	Glu	Leu	Thr	Ser	Lys	Thr	Lys	Ala	Glu	Leu	Thr
1				5					10					15	
Ala	Ala	Phe	Glu	Gln	Phe	Lys	Lys	Asp	Thr	Leu	Lys	Pro	Glu	Lys	Lys
			20					25					30		
Val	Ala	Glu	Ala	Glu	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Lys
			35				40					45			
Asp	Gln	Lys	Glu	Glu	Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Asn	Thr	Tyr	Lys
		50					55				60				
Thr	Leu	Glu	Leu	Glu	Ile										
65					70										

<210> 235
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 235

Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr
1 5 10 15
Ala Ala Phe Glu Gln Phe Lys Lys Asp Thr Leu Lys Pro Glu Lys Lys
20 25 30
Val Ala Glu Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Lys
35 40 45
Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys
50 55 60
Thr Leu Glu Leu Glu Ile
65 70

<210> 236

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 236

Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr
1 5 10 15
Ala Ala Phe Glu Gln Phe Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys
20 25 30
Val Ala Glu Ala Glu Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys
35 40 45
Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys
50 55 60
Thr Leu Asp Leu Glu Ile
65 70

<210> 237

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 237

Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr
1 5 10 15

Ala Ala Phe Glu Gln Phe Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys
20 25 30

Val Ala Glu Ala Gln Lys Lys Val Ala Glu Ala Glu Lys Lys Ala Lys
35 40 45

Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys
50 55 60

Thr Leu Asp Leu Glu Ile
65 70

<210> 238

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 238

Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr
1 5 10 15

Ala Ala Phe Glu Gln Phe Lys Lys Asp Ser Leu Lys Ser Gly Lys Lys
20 25 30

Val Ala Glu Ala Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Ala Lys
35 40 45

Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys
50 55 60

Thr Leu Glu Leu Glu Ile
65 70

<210> 239

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 239

Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr
1 5 10 15

Ala Ala Phe Glu Gln Phe Lys Lys Asp Ser Leu Lys Pro Glu Lys Lys
20 25 30

Val Ala Glu Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu

35 40 45
 Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys
 50 55 60

Thr Leu Glu Leu Glu Ile
 65 70

<210> 240
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 240
 Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys
 1 5 10 15

Glu Glu Ala Asn Glu Ser Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys
 20 25 30

Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
 35 40 45

Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu
 50 55 60

Glu Ser Glu Lys Lys Ala
 65 70

<210> 241
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 241
 Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys
 1 5 10 15

Glu Glu Ala Asn Glu Ser Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys
 20 25 30

Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
 35 40 45

Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu
 50 55 60

Glu Ser Glu Lys Lys Ala
65 70

<210> 242
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 242
Ala Glu Ser Asp Val Lys Val Lys Lys Ala Glu Leu Glu Leu Val Lys
1 5 10 15

Glu Glu Ala Asn Glu Ser Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys
20 25 30

Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
35 40 45

Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu
50 55 60

Glu Ser Glu Lys Lys Ala
65 70

<210> 243
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 243
Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys
1 5 10 15

Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu Lys Ile Lys Gln Ala Lys
20 25 30

Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile
35 40 45

Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala
50 55 60

Glu Glu Asp Lys Lys Ala
65 70

<210> 244
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 244
Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys
1 5 10 15
Glu Glu Ala Lys Glu Ser Arg Asn Glu Glu Lys Val Lys Gln Ala Lys
20 25 30
Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
35 40 45
Lys Thr Asp Arg Lys Lys Ala Ala Glu Glu Ala Lys Arg Arg Ala Ala
50 55 60
Glu Glu Asp Lys Lys Ala
65 70

<210> 245
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 245
Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys
1 5 10 15
Glu Glu Ala Lys Glu Ser Arg Asn Glu Glu Lys Val Lys Gln Ala Lys
20 25 30
Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
35 40 45
Lys Thr Asp Arg Lys Lys Ala Ala Glu Glu Ala Lys Arg Lys Ala Ala
50 55 60
Glu Glu Asp Lys Lys Ala
65 70

<210> 246
<211> 70
<212> PRT

<213> Streptococcus pneumoniae

<400> 246

Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu Val Lys
1 5 10 15

Glu Glu Ala Lys Glu Pro Arg Asn Glu Glu Lys Val Lys Gln Ala Lys
20 25 30

Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
35 40 45

Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala
50 55 60

Glu Glu Asp Lys Lys Ala
65 70

<210> 247

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 247

Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala
1 5 10 15

Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu
20 25 30

Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu
35 40 45

Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser
50 55 60

Lys Leu Glu Glu Leu Ser
65 70

<210> 248

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 248

Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala

1	5	10	15
Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu			
20	25	30	
Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu			
35	40	45	
Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser			
50	55	60	
Lys Leu Glu Glu Leu Ser			
65	70		

<210> 249
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 249
Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala
1 5 10 15
Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu
20 25 30
Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu
35 40 45
Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser
50 55 60
Lys Leu Glu Glu Leu Ser
65 70

<210> 250
 <211> 70
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 250
Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala
1 5 10 15
Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu
20 25 30

Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu
35 40 45

Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser
50 55 60

Lys Leu Glu Glu Leu Ser
65 70

<210> 251

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 251

Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala
1 5 10 15

Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu
20 25 30

Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu
35 40 45

Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser
50 55 60

Lys Leu Glu Glu Leu Ser
65 70

<210> 252

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 252

Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala
1 5 10 15

Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu
20 25 30

Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu
35 40 45

Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser
50 55 60

Lys Leu Glu Glu Leu Ser
65 70

<210> 253

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 253

Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala
1 5 10 15

Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu
20 25 30

Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu
35 40 45

Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser
50 55 60

Lys Leu Glu Glu Leu Ser
65 70

<210> 254

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 254

Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val Gln
1 5 10 15

Leu Lys Asp Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu
20 25 30

Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala
35 40 45

Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Ala Pro
50 55 60

Ala Pro Gln Pro Ala Pro

65

70

<210> 255

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 255

Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val Gln
1 5 10 15

Leu Lys Asp Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu
20 25 30

Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala
35 40 45

Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Ala Pro
50 55 60

Ala Pro Gln Pro Ala Pro
65 70

<210> 256

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 256

Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val Gln
1 5 10 15

Leu Lys Asp Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu
20 25 30

Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala
35 40 45

Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Ala Pro
50 55 60

Ala Pro Gln Pro Ala Pro
65 70

<210> 257

<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 257

Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val Lys
1 5 10 15
Glu Lys Pro Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu
20 25 30
Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala
35 40 45
Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Gln Pro
50 55 60
Gln Pro Ala Pro Ala Thr
65 70

<210> 258
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 258

Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val Lys
1 5 10 15
Glu Lys Pro Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu
20 25 30
Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala
35 40 45
Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Gln Pro
50 55 60
Gln Pro Ala Pro Ala Pro
65 70

<210> 259
<211> 70
<212> PRT
<213> Streptococcus pneumoniae

<400> 259

Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val Lys
1 5 10 15

Glu Lys Pro Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu
20 25 30

Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala
35 40 45

Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Gln Pro
50 55 60

Gln Pro Ala Pro Ala Pro
65 70

<210> 260

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 260

Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val Lys
1 5 10 15

Glu Lys Pro Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys Glu
20 25 30

Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys Ala
35 40 45

Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Gln Pro
50 55 60

Gln Pro Ala Pro Ala Pro
65 70

<210> 261

<211> 69

<212> PRT

<213> Streptococcus pneumoniae

<400> 261

Ala Pro Glu Lys Pro Thr Glu Glu Ala Glu Lys Pro Ala Pro Ala Pro
1 5 10 15

Lys Pro Glu Lys Pro Ala Pro Ala Pro Lys Ala Glu Lys Pro Ala Pro
 20 25 30

Ala Pro Ala Glu Lys Pro Ala Glu Glu Pro Ala Glu Lys Pro Ala Pro
 35 40 45

Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Thr Pro
 50 55 60

Glu Thr Pro Lys Thr
 65

<210> 262

<211> 70

<212> PRT

<213> Streptococcus pneumoniae

<400> 262

Ala Pro Glu Lys Pro Thr Glu Glu Ala Glu Lys Pro Ala Pro Ala Pro
 1 5 10 15

Ala Pro Glu Lys Pro Ala Pro Ala Pro Lys Ala Glu Lys Pro Ala Pro
 20 25 30

Ala Pro Ala Glu Lys Pro Ala Glu Glu Pro Ala Glu Lys Pro Ala Pro
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Glu Lys Pro Ala Pro Ala
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<211> 69

<212> PRT

<213> Streptococcus pneumoniae

<400> 263

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Ser Thr Pro Lys Thr
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<213> Streptococcus pneumoniae

<400> 266
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35 40 45
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50 55 60

Ser Thr
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<210> 267
<211> 69
<212> PRT
<213> Streptococcus pneumoniae

<400> 267
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35 40 45
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50 55 60

Ser Thr Pro Lys Thr
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<212> PRT

<213> Streptococcus pneumoniae

<400> 268

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<211> 730

<212> PRT

<213> Streptococcus pneumoniae

<400> 269

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Thr Ser Ser Gly Asp Glu Val Glu Ser His Tyr Gln Ser Ile Leu Glu
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Lys Val Arg Lys Ser Leu Glu Lys Asp Arg His Thr Gln Asn Val Asp
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Leu Ile Lys Lys Leu Gln Asp Ile Lys Arg Thr Tyr Leu Tyr Asn Leu
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Lys Glu Lys Pro Glu Ala Glu Leu Thr Ser Lys Thr Asn Lys Glu Leu
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Asp Ala Ala Phe Glu Lys Phe Lys Lys Glu Pro Glu Leu Thr Lys Lys
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Leu Ala Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp His
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Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Ile Glu Leu Glu Ile Ala
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Ser Asp Ile Glu Lys Thr Tyr Leu Tyr Lys Leu Asp Asn Ser Thr Lys		
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Ser Arg Glu Leu Lys Glu Thr Ile Asp Lys Ala Lys Glu Thr Leu Ser		
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Gln Leu Thr Lys Leu Asn Asp Ala Met Ser Lys Leu Lys Glu Ala Lys		
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675

680

685

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<211> 2349

<212> DNA

<213> Streptococcus pneumoniae

<400> 270

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<211> 2405

<212> DNA

<213> Streptococcus pneumoniae

<400> 271

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<211> 2774

<212> DNA

<213> Streptococcus pneumoniae

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<211> 2489

<212> DNA

<213> Streptococcus pneumoniae

<400> 273

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<211> 1680

<212> DNA

<213> Streptococcus pneumoniae

<400> 274

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<210> 275

<211> 1766

<212> DNA

<213> Streptococcus pneumoniae

<400> 275

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<211> 1590

<212> DNA

<213> Streptococcus pneumoniae

<400> 276

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